

## **China's Water Management Options: Issues and Alternatives**

Baruch Boxer

March, 1999

### Introduction

China must make significant changes in water management assumptions and practices within the next decade to provide a foundation for sustainable economic development. China's 1988 Water Law, now under revision, must be promptly and universally adopted. It provides a comprehensive and rational framework for implementing newly-defined relations among government agencies' roles, innovative economic strategies, and better targeted structural interventions to foster sustainable water use and more effective water control. The Chinese Government and Communist Party fully recognize the urgent need to creatively address water problems, and attention to water-related concerns is a top priority.

Water shortages in the industrial, energy, agricultural, transportation, and urban supply sectors, especially in North China, hamper the country's market transition. Nationwide, inadequate municipal and industrial wastewater treatment, and the growing pollution of rivers, lakes, and other surface and ground water sources threatens public health and undermines essential ecological services. Critical management issues have been delimited and debated for several decades. Difficulties in making essential adjustments in response to water shortages, flooding, and deteriorating quality, however, reflect complex problems of implementing institutional changes and adopting economic measures to control pollution and save water.

This paper briefly assesses water resources management issues as they reflect China's demographic and physical conditions and the unique place of water concerns in Chinese society and culture. It also considers alternatives and mechanisms that might facilitate transition to a better integrated water management regime that can adequately support the economic and social transformation now underway in China.

### Definitions and Challenges

Current Chinese efforts to rationalize and coordinate water policies and programs are stymied by ambiguities surrounding responsibilities and priorities in pursuing various aspects of the water management enterprise, commonly referred to as *shuili* (water benefits), encompassing technical, historical-cultural, and institutional aspects. Clear definitions are essential if specific economic, technical, or institutional objectives are to be met. This is especially true in the present context. Mutually beneficial results from a US-China cooperative technical program in water resources management require both sides' recognition of distinctive policy, legal, and culturally-grounded perspectives on diverse water issues, management goals and standards, and institutional constraints and opportunities.

In China, for example, major decisions governing specific economic policy and structural engineering strategies in different water problem areas must be made under the pressure of rapid social and economic change when well-established values, precedents, and priorities in water management are being seriously questioned. It is essential, therefore, that both sides clarify from the outset their views on the potential contributions and limitations of technical programs in realizing clearly defined water-related social, environmental, economic, and public health goals.

China's great physical diversity, high population density in the eastern third of the country, regional hydrological disparities, and uncertainties in the timing of water supply, make it difficult to develop and implement national water management programs. There are intensifying efforts to better coordinate and link economic, engineering and regulatory interventions within and across sectors at local, provincial, and basin-levels. It is not merely a matter, for instance, of coming up with structural solutions for urban shortages through inter-basin transfer projects, assuring timely irrigation in North China, or preserving flood retention zones in face of steady development encroachment in the lower Yangzi basin or the Pearl River delta. Here, the problem is how to deal simultaneously with closely linked water shortages, pollution, and environmental damage in face of growing recognition of the increasingly untenable social and ecological costs of relying primarily on structural engineering solutions.

A related aspect of China's water environment that compounds difficulties of coordinating management options across sectors, is the interconnected nature of small and large scale problems. China has a large, densely settled population, with industry, food production, energy generation, transportation infrastructure, and urban growth intensively focused on flood plains. The complex human ecology of water use is magnified simultaneously through successively larger geographic scales in many locales. This makes it difficult to independently calculate the benefits and costs of water management options for one sector as these costs and benefits may simultaneously affect the water demand or use values of other spatially coterminous or overlapping sectors.

### Issues and Alternatives

Prompt implementation of broadly acceptable water management strategies and policies is largely contingent upon universal endorsement of the State Council's recent attempts to clarify the central government's water management responsibilities. The State Council reaffirmed the leading role of the key government water agency, the *Shuilibu* (Ministry of Water Resources, henceforth, Ministry). Influential water elements of the environmental, agriculture, construction, mining and other sectoral ministries, however, must acknowledge the Ministry's ultimate authority in comprehensive management of water resources, including the drafting of long term national and inter-provincial water supply plans.

This is essential if water science, policy, finance, and regulation are to be effectively coordinated to sustain water supply and quality under the stress of China's rapidly emerging market economy. Traditionally, the central government's water agency was responsible for virtually every aspect of water management, including flood prevention and control, irrigation, drought relief and urban supply, sea wall construction, and inland waterway maintenance. Government legitimacy, in fact, was measured in relation to the relative success of the water agency in fulfilling its multisectoral responsibilities.

In the transition to a market economy underway since the late 1980s, traditional Ministry functions and responsibilities are being reassessed in light of new pressures to conserve and control water, maintain and restore water quality, and protect "ecological balance" (i.e., ecosystem integrity and ecological services). To achieve these multiple goals, the Ministry is expected to play the leading role in shaping a new management regime with three major thrusts:

- 1) primary reliance on the nascent rule of law to promote coordinated water resources development, protection, and use, building on the 1988 Water Law, and complementary soil conservation, pollution control, forestry, energy conservation, land management, and other environment-related laws;

- 2) improved vigilance, efficiency, and economy in maintaining and strengthening infrastructure for better flood protection, relief, and reconstruction, along with active promotion of regulatory and technical water saving measures to enhance urban supply, and industrial, energy, and agricultural production; and
- 3) rapid “industrialization” (i.e. commercialization) of all aspects of the water enterprise to reduce the need for government subvention.

Realization of these medium term goals by 2010 requires that the engineering-oriented Ministry reorient its activities and personnel in response to a flurry of directives from the State Council in the last few years that require fundamental changes in funding procedures, accounting principles, and evaluation criteria for water engineering and flood control projects while promoting new water pricing systems and other market mechanisms for project construction and maintenance support. These pricing systems aim simultaneously to assign equity and market values for services in support of “comprehensive” management, including flood prevention and control, irrigation, urban water supply, and pollution control. Detailed directives to implement these changes were promulgated in September, 1998.

The Ministry must therefore modify traditional priorities and practices while forging new relationships with other agencies responsible for construction, public health, land management, environmental control, and development planning. In this regard, there is a struggle underway to redefine and expand the Ministry’s fundamental humanitarian mission in response to the challenges of serving the water needs of a technologically transformed landscape.

A key question for China is whether the Ministry will be able to expand its traditional role of protecting people from natural hazards while reorienting its programs in cooperation with other agencies in support of market-driven economic development. Unusually severe flooding in Eastern and Northeastern China in Summer, 1998 dramatically reaffirmed the continuing dominance of the Ministry as the preeminent flood fighting and relief organization. At the same time, however, the Ministry must gradually wean itself from central government capital construction budgets to a system where projects are justified, constructed, and evaluated on the basis of clearly-stated, economically sound principles.

Difficulties faced in building a market foundation for hydraulic engineering construction are suggested by distinctions now drawn between projects with primarily social support objectives and those that provide more attractive investment opportunities. Thus, “backbone” flood prevention and control works, irrigation and soil erosion control projects, urban flood prevention, and water source protection are critical for societal well being and must still be assured central government support. In contrast, water supply infrastructure, reservoir aquaculture, wastewater treatment, and water-based recreational projects, among others, are to be justified primarily on the basis of their potential for favorable economic returns. Projects where societal benefits are of primary concern are still supported on Marxist ideological grounds despite universal commitment to building a “market-based socialist economy.”

## Conclusion

There are many contradictions in current efforts to reassess water management criteria, responsibilities, and goals. Yet efforts to resolve these contradictions are confronted by China’s human and environmental realities. Implementation of a rational legal framework is a positive step forward. Such a framework will help set water use priorities, specify water permitting practices and fee systems, help to better allocate supplies in response to demand, and define other regulatory policy mechanisms to save water and strengthen demand management.

Ultimately, however, the insatiable water demands of the growth-driven market economy must be tempered by the realization that China's prosperity and stability depends, as it has for over two millennia, on the conversion of water shortages and hazards into water benefits for people and nature. Technical and institutional measures to save water and improve water quality in the various sectors can contribute to this difficult task. China's main challenge, however, is successfully applying modern water management policy tools. The longevity of China's ancient civilization is largely attributable to its ability to develop institutions and technologies that could sustain essential water-based material and energy exchanges between people and nature in a diverse and challenging environment. In the next century and beyond, water will continue to be the key element in China's sustainable development.

This material is based upon work supported by the National Science Foundation under Grant No.SBER93-11823. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.